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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/723,237

11/26/2003

Chih-Ta Wu

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9171

47390

7590

04/20/2006

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EXAMINER

TRINH, MICHAEL MANH

ART UNIT

PAPER NUMBER

2822

DATE MAILED: 04/20/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/723,237

Applicant(s)

WU ET AL.

Examiner

Michael Trinh

Art Unit

2822

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 03 February 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 31-37 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 31-37 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

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## DETAILED ACTION

\*\*\* This office action is in response to Applicant's amendment filed on February 03, 2006.

Claims 1-30 were cancelled. Claims 31-37 have been newly added.

\*\*\* The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

### *Claim Objection*

1. Claim 36 is objected for containing some typographical errors, in which "2000sccm" and "500□ and 700□" should be --2000 sccm-- and --500° and 700°--. Appropriate correction is required.

### *Claim Rejections - 35 USC § 102*

2. Claims 31-35,37 are rejected under 35 U.S.C. 102(b) as being anticipated by Zhang et al (6,436,819).

Re claim 31, Zhang et al teach (at Figs 5a-5e, col 8, line 33 through col 10, line 30; and Figs 7a-7d, 8a-8d, col 11, line 4 through col 12, line 52) a method for processing a TiN layer on a substrate comprising at least the steps of: providing a substrate 502; depositing a TiN layer (508,708,808; Figs 5-8) with a halogen containing titanium source gas and a nitrogen source gas on the substrate in a first process chamber (col 8, line 33 through col 10, line 30; and col 11, line 4 through col 12, line 52); and subject the TiN layer to a plasma treatment involving a reactive gas consisting essentially of pure nitrogen (e.g. N<sub>2</sub> at col 8, lines 33-51; col 2, lines 5-12). Re claim 32, wherein the nitrogen source gas is NH<sub>3</sub> (col 8, lines 33-36). Re claim 33, wherein the halogen containing titanium source gas is TiCl<sub>4</sub> (col 8, lines 33-36). Re claim 34, wherein the deposition is chemical vapor deposition (col 8, lines 26-29; col 9, lines 28-67; col 11, line 35-67). Re claim 35, wherein the plasma treatment is performed ex-situ in a second process chamber by using various multi-chambers, in which each chamber can be used for a specific process (col 4, lines 10-20; col 8, lines 35-61; col 11, lines 43-67). Re claim 37, wherein a metal layer is deposited on the TiN layer after the plasma treatment and planarizing to form a contact (col 9, lines 43-48; col 13, line 65 through col 14; col 1, lines 43-53).

***Claim Rejections - 35 USC § 103***

3. Claim 36 is rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang et al (6,436,819), as applied to claims 31-35,37 above, taken with Chou (2002/0168468).

Zhang et al teach a method for processing a TiN layer on a substrate as applied to claims 31-35,37 above.

Re claim 36, although Zhang does not anticipatively disclose the same parameter values as recited in claim 36, Zhang also substantially teaches (at col 8, lines 33-51; col 10, lines 15-30; col 13, lines 46-57) the plasma treatment comprising a nitrogen flow rate of 100-3000 sccm, a chamber temperature of to about 1000°C, preferably 300-500°C, a RF power of about 600-2000 W, preferably 750 W, a pressure of about 1-10 Torr, wherein a time duration is about 0.1-1500 minutes, wherein a processing time of about 20 seconds is mentioned at col 13, lines 46-57. Moreover, Chou also teaches the plasma treatment comprising a nitrogen-containing gas for flow rate of about 100-1000 sccm, a chamber temperature of about 400-1000°C, a chamber pressure of about 5-30 Torr, a RF power of about 0.5 W/cm<sup>2</sup> to 10W/cm<sup>2</sup>, for a processing time of about 5-1000 seconds (paragraphs 53-54).

Therefore, the subject matter as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made to select the portion of prior art's range of pressure, temperature, power, flow rate, such as taught by Zhang and Chou, which is within the range of applicant's claims, because it has been held to be obvious to select a value in a known range by optimization for the best results, and would be an unpatentable modification, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation". *In Re Aller* 104 USPQ 233,255 (CCPA 1955); *In re Waite* 77 USPQ 586 (CCPA 1948); *In Re Swanson* 56 USPQ 372 (CCPA 1942); *In Re Sola* 25 USPQ 433 (CCPA 1935); and *In Re Dreyfus* 24 USPQ 52 (CCPA 1934).

***Response to Amendment***

4. Applicant's arguments with respect to new claims 31-37 have been considered but are moot in view of the new ground(s) of rejection.

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Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael M. Trinh whose telephone number is (571) 272-1847. The examiner can normally be reached on M-F: 9:00 Am to 5:30 Pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Zandra Smith can be reached on (571) 272-2429. The central fax phone number is (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).  
Oacs-18-19



Michael Trinh  
Primary Examiner